Amendments to the Drawings

Figs. 1, 3, and 4 have been amended to further clarify the claimed invention. Replacement sheets for the originally filed drawing sheets on which a figure has been amended are included herewith.

Attachment: Replacement Sheets containing amended Figs. 1, 3, and 4

REMARKS

Claims 1-25 are pending in the case. Further examination and reconsideration of pending claims 1-25 are respectfully requested.

Drawings

The Office Action states: "Please label the blocks in figures 1 and 3-6." (Office Action -- page 2). The drawings have been amended to include labels in the boxes of Figs. 1 and 3-4. Entrance of the amendments to Figs. 1 and 3-4 is respectfully requested.

Applicants believe that the elements shown in Figs. 5 and 6 are appropriately labeled as originally filed. Therefore, Applicants respectfully request the Examiner to provide more information regarding the contended deficiencies of Figs. 5 and 6 such that Applicants can make the appropriate amendments if necessary.

Section 102 Rejections

Claims 1-3, 5-11, 20-21, 23, and 25 were rejected under 35 U.S.C. § 102(b) as being anticipated by "Contactless Surface Charge Semiconductor Characterization" by Schroder (hereinafter "Schroder"). Claim 15 was rejected under 35 U.S.C. § 102(b) as being anticipated by "Corona-Oxide-Semiconductor Device Characterization" by Schroder et al. (hereinafter "Schroder et al."). As will be set forth in more detail below, the § 102 rejections of claims 1-3, 5-11, 15, 20-21, 23, and 25 are respectfully traversed.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), MPEP § 2131. The cited art does not disclose all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

The cited art does not teach determining a parameter of an insulating film as an average of individual parameters determined for two or more measurement sequences. Independent claim 1 recites in part: "determining individual parameters for the two or more sequences from the at least two

surface voltages and the different charge depositions; and determining the parameter of the insulating film as an average of the individual parameters."

Schroder discloses contactless surface charge semiconductor characterization. Schroder, however, does not disclose determining a parameter of an insulating film as an average of individual parameters determined for two or more measurement sequences. The Office Action states that "Referring to claim 1, Schroder discloses...determining the parameter of the insulating film as an average of the individual parameters (page 205, 2nd col., 1st paragraph, figure 16)." (Office Action -- page 2). However, Schroder states that "The surface voltage is then plotted as function of deposited charge density as shown in Fig. 17 and the oxide capacitance is determined from the slope [57]." (Schroder -- p. 205, col. 2, paragraph 1 - page 206, col. 1, paragraph 1). Therefore, Schroder discloses determining a parameter (e.g., capacitance) of an insulating film (e.g., oxide) as a slope of a plot of surface voltage vs. deposited charge density, not as an average of individual parameters.

Schroder also states that "A comparison of the two approaches is shown in Fig. 16, where the charge measurement uncertainty has a 3σ variation of 2×10^{10} cm $^{-2}$." (Schroder -- p. 204, col. 2, last paragraph). In addition, Fig. 16 of Schroder illustrates "Charge-based and voltage-based oxide charge repeatability for 3 nm oxides." (Schroder -- p. 206, col. 1, title of Fig. 16). Therefore, Fig. 16 of Schroder illustrates variations in different measurements, not determining a parameter of an insulating film as an average of individual parameters. As such, Schroder does not teach determining a parameter of an insulating film as an average of individual parameters determined for two or more measurement sequences, as recited in claim 1. Consequently, Schroder does not teach all limitations of claim 1.

The cited art does not teach determining a characteristic of nitrogen in an insulating film. Independent claim 15 recites in part: "A computer-implemented method, comprising determining a characteristic of nitrogen in an insulating film."

Schroder et al. discloses corona-oxide-semiconductor device characterization. Schroder et al., however, does not disclose determining a characteristic of nitrogen in an insulating film. For example, Schroder et al. states that "Silicon wafers 200 mm in diameter, n-type, (100)-orientation of 10 Ω cm resistivity were prepared as shown in Fig. 6. Some wafers were ion implanted. The generation lifetime, flatband voltage, oxide thickness, and doping density were measured by the corona charging method." (Schroder et al. -- p. 509, col. 2, paragraph 2). As shown in Fig. 6 of Schroder et al., prior to corona-oxide-

semiconductor measurements, n-Well Implant 1 or 2 is performed on the wafers. As is known to one of ordinary skill in the art, n-well implants are formed in the semiconductor wafer, not an insulating film formed on the wafer. Therefore, the doping density that is measured is the doping density of the semiconductor, not the insulating film.

Schroder et al. also states that "For junction devices it yields the near surface doping density." (Schroder et al. -- abstract). In addition, Schroder et al. states that "By forming junctions, the generation lifetime and surface doping density can be determined." (Schroder et al. -- p. 512, col. 1, paragraph 1). Therefore, Schroder et al. discloses determining a doping density of a junction, which is known to one of ordinary skill in the art to be formed in a semiconductor wafer, or a well in a semiconductor wafer, not a doping density of an insulating film. As such, Schroder et al. does not teach determining a characteristic of nitrogen in an insulating film, as recited in claim 15. Consequently, Schroder et al. does not teach all limitations of claim 15.

The cited art does not teach determining a characteristic of nitrogen in an insulating film using two parameters of the insulating film selected from the group consisting of equivalent oxide thickness, optical thickness, and a measure of leakage through the insulating film. Independent claim 15 recites in part: "A computer-implemented method, comprising determining a characteristic of nitrogen in an insulating film using two parameters of the insulating film selected from the group consisting of equivalent oxide thickness, optical thickness, and a measure of leakage through the insulating film."

Schroder et al. does not disclose determining a characteristic of nitrogen in an insulating film using two parameters of the insulating film selected from the group consisting of equivalent oxide thickness, optical thickness, and a measure of leakage through the insulating film. For example, Schroder et al. states that "The determination of the doping density follows from the following equations...Equations (19) (23) are solved iteratively for N_A." (Schroder et al. -- p. 510, col. 2, paragraph 3). However, Equations (19)-(23) of Schroder et al. do not include variables for at least two of equivalent oxide thickness, optical thickness, and a measure of leakage through an insulating film. In fact, Schroder et al. appears to make no mention whatsoever of an optical thickness or a measure of leakage through an insulating film. Therefore, Schroder et al. cannot teach determining a characteristic of nitrogen in an insulating film using at least two of the three parameters of the presently claimed group. As such, Schroder et al. cannot teach determining a characteristic of nitrogen in an insulating film using two parameters of the insulating film selected from the group consisting of equivalent oxide thickness, optical thickness, and a measure of leakage through the

insulating film, as recited in claim 15. Consequently, Schroder et al. does not teach several limitations of claim 15.

The cited art does not teach determining a characteristic of a component in an insulating film using two parameters of the insulating film selected from the group consisting of equivalent oxide thickness, optical thickness, and a measure of leakage through the insulating film. Independent claim 20 recites in part: "determining a characteristic of an insulating film using two parameters of the insulating film selected from the group consisting of equivalent oxide thickness, optical thickness, and a measure of leakage through the insulating film, wherein the characteristic comprises a dose of a component in the insulating film, a percentage of the component in the insulating film, or a presence of the component in the insulating film."

Schroder does not disclose determining a characteristic of a component in an insulating film using two parameters of the insulating film selected from the group consisting of equivalent oxide thickness, optical thickness, and a measure of leakage through the insulating film. For example, Schroder states that "The key to this wide acceptance was the discovery that iron in boron-doped silicon could be easily determined with minority carrier diffusion length measurements." (Schroder -- p. 197, col. 2, paragraph 2). Schroder also states that "By measuring the diffusion length before (L_{ni}) and after (L_{nf}) Fe-B pair dissociation, the iron density N_{Fe} is obtained." (Schroder -- p. 204, col. 1, paragraph 1). Therefore, Schroder discloses determining a characteristic of a component (e.g., iron) in silicon using minority carrier diffusion length, not two of the presently claimed group. As such, Schroder does not teach determining a characteristic of a component in an insulating film using two parameters of the insulating film selected from the group consisting of equivalent oxide thickness, optical thickness, and a measure of leakage through the insulating film, as recited in claim 20. Consequently, Schroder does not teach all limitations of claim 20.

The cited art does not teach determining physical thickness of an insulating film. Independent claim 21 recites in part: "A computer-implemented method, comprising determining at least one composition parameter and physical thickness of an insulating film."

Schroder does not disclose determining physical thickness of an insulating film. For example, Schroder states that "The oxide thickness is determined by depositing corona charge density Q on the oxidized wafer and measuring the surface voltage." (Schroder -- p. 205, col. 1, paragraph 1). As is known

to one of ordinary skill in the art, a thickness determined in this manner (e.g., from electrical measurements) is an electrical thickness. In addition, as is known to one of ordinary skill in the art, an electrical thickness is not equivalent to a physical thickness. Therefore, Schroder discloses determining electrical thickness of an oxide, not a physical thickness of an oxide. As such, Schroder does not teach determining physical thickness of an insulating film, as recited in claim 21. Consequently, Schroder does not teach all limitations of claim 21.

For at least the reasons set forth above, independent claims 1, 15, 20, and 21, as well as claims dependent therefrom, are not anticipated by the cited art. Accordingly, removal of the § 102 rejections of claims 1-3, 5-11, 15, 20-21, 23, and 25 is respectfully requested.

Allowable Subject Matter

Claims 4, 12-14, 16-19, 22, and 24 were objected to as being dependent upon a rejected base claim, but were deemed allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants appreciate the Examiner's indication of allowable subject matter and awaits allowance of the remaining claims in the case.

Information Disclosure Statements

Applicants note that reference A11 of the Information Disclosure Statement filed on March 22, 2204 has not been considered by the Examiner. A copy of reference A11 and the Form PTO-1449 of this Information Disclosure Statement is submitted herewith. Careful consideration of reference A11 listed on the Form PTO 1449 of this Information Disclosure Statement and return of the signed page are respectfully requested.

CONCLUSION

This response constitutes a complete response to all issues raised in the Office Action mailed April 5, 2005. In view of the remarks presented herein, Applicants assert that pending claims 1-25 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned earnestly requests a telephone conference.

The Commissioner is authorized to charge any fees, which may be required, or credit any overpayment, to deposit account number 50-3268/5589-06800.

Respectfully submitted,

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